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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,461	09/29/2003	Ping Hsu	HSUP3012/EM	1507
23364	7590	02/18/2005	EXAMINER	
BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			LINDSAY JR, WALTER LEE	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 02/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

**Office Action Summary**

Application No.

10/671,461

Applicant(s)

HSU ET AL.

Examiner

Walter L. Lindsay, Jr.

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                            | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.                                                |

### **DETAILED ACTION**

This Office Action is in response to an Application filed on 9/29/2003.

Currently, claims 1-6 are pending.

#### ***Specification***

1. The disclosure is objected to because of the following informalities: in line 7 of page 1 "electrical" should be "electrical".

Appropriate correction is required.

2. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

#### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being obvious over the Applicant's Admitted Prior Art (AAPA) filed on 9/29/2003 in view of Gluschenkov et al. (U.S. Patent No. 6,838,334 filed 1/4/2005).

The AAPA shows the method substantially as claimed in Figs. 1A-1E and corresponding text as: providing a substrate (10) (page 1, line 11); forming a deep trench in said substrate (page 1, lines 10-11); forming a dielectric layer (12) in said deep trench, said dielectric layer covering the sidewall and bottom of the deep trench (page 1, lines 12-13); filling the deep trench with a first polymer (13) (page 1, lines 13-16); removing a portion of said dielectric layer not covered by said first polymer (page 1, lines 16-18); refilling the deep trench with another dielectric layer (14), said another dielectric layer covering a portion of the sidewall of the deep trench not covered by said first polymer (page 1, lines 19-22); forming a collar oxide layer (16) in the deep trench (page 1, lines 23-29); filling the deep trench with a second polymer (17) (page 1, lines 23-29); removing a portion of said collar oxide layer not covered by said second polymer (page 1, lines 30-32); and filling the deep trench with a third polymer (18) (page 1, line 33- page 2, line 1) (claim 1).

The AAPA lacks the anticipation of explicitly teaching that: 1) removing unnecessary portion of said another dielectric layer; and forming a collar oxide layer in the deep trench, said collar oxide layer covering a portion of the sidewall of the deep trench not covered by the dielectric layers (claim 1); 2) the material of said dielectric layer is the same as that of said another dielectric layer (claim 2); 3) the material of said dielectric layer and said another dielectric layer is nitride (claim 3); 4) the material of

said dielectric layer and said another dielectric layer is silicon nitride (claim 4); 5) the another dielectric layer is a nitride layer (claim 5); and 6) the material of said another dielectric layer is silicon nitride (claim 6).

Gluschenkov teaches the fabrication of a collar region in a similar deep trench formation process. Dielectric layer (125) is formed inside the trench region (col. 2, lines 16-34). A bottom dielectric layer (135) is also formed it is comprised of  $\text{Si}_3\text{N}_4$  (col. 2, lines 35-67). The dielectric layer (125) is comprised of about 30 Å to 200 Å of  $\text{Si}_3\text{N}_4$  (col. 2, lines 35-67). The trench is filled with polysilicon and an upper portion of dielectric layer (125) is removed from the trench. This process helps to overcome the problems found as dimensions shrink, to reduce the amount of space taken up by the collar and to suppress vertical parasitic leakage.

It would be obvious to one of ordinary skill in the art at the time the invention was made to modify the method as given by the AIPA by removing unnecessary portion of said another dielectric layer, forming a collar oxide covering the portion of the sidewall not covered by the dielectric and forming both dielectrics out of silicon nitride, as taught by Gluschenkov, with the motivation that the Gluschenkov teaches that the problem of dimensions shrinking can be handled by the reduction of the amount of space the collar occupies and to suppress vertical parasitic leakage.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter L. Lindsay, Jr. whose telephone number is (571) 272-1674. The examiner can normally be reached on Monday-Thursday.

Art Unit: 2812

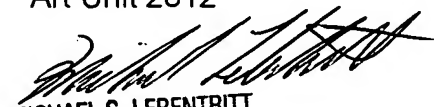
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

WLL

February 7, 2005

Walter L. Lindsay, Jr.  
Examiner  
Art Unit 2812

  
MICHAEL S. LEBENTRITT  
PRIMARY EXAMINER